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Malaria, U.S. Army, 2005

Malaria is a mosquito-transmitted parasitic disease that is endemic throughout the tropics and in some temperate regions.[1] Malaria accounts for as many as 300 million acute illnesses and more than 1 million deaths each year worldwide.[1] Four *Plasmodium* species are capable of infecting humans and causing malaria: *Plasmodium falciparum* (the most deadly), *Plasmodium vivax* (the most common), *Plasmodium ovale*, and *Plasmodium malariae.*[1]

Throughout history, malaria has been a disease of military operational importance.[2,3] Currently, U.S. servicemembers are at risk of malaria when they are permanently assigned to endemic areas (e.g., near the Demilitarized Zone [DMZ] in Korea[4-7]); when they participate in training or military operations in endemic areas; or when they visit malarious areas during personal travels.

Since 2001, malaria (particularly *P. vivax*) has threatened U.S. military forces that conduct/support operations in Central Asia[8,9] and the Middle East.[10] For example, in 2002, 38 U.S. Army Rangers acquired vivax malaria while operating in eastern Afghanistan.[9] This report summarizes the malaria experiences of U.S. soldiers during calendar year 2005 and compares it to recent experience.

Methods: The Defense Medical Surveillance System was searched to identify all records of hospitalizations and all reports to the Army's Reportable Medical Events System (RMES) that included primary diagnoses of malaria (ICD-9-CM: 084.0-084.9) among U.S. Army soldiers during calendar year 2005. For this summary, only one episode of malaria per soldier was included. When multiple records were available for a single case, the date of the earliest was considered the date of clinical onset and the most specific diagnosis (typically from an inpatient record) was used to classify the type. Presumed locations of malaria acquisition were estimated using the following algorithm: (1) cases diagnosed in Korea were considered Korea-acquired; (2) cases documented through RMES that listed exposures to malaria endemic locations were considered acquired in those locations (if more than one malaria endemic location was listed, the first was considered the location of infection acquistion); (3) cases among soldiers who had been assigned to Korea within 2 years of diagnosis were considered acquired in Korea; (4) all remaining cases were considered acquired in "other/unknown" areas.

Results: In 2005, 40 U.S. Army soldiers were hospitalized for/reported with malaria. Twenty-three cases (58%) were attributed to *P. vivax* and only 2 (5%) to *P. falciparum* (the rest were reported as "other/unknown" types) (Table 1). Overall, there were fewer cases of malaria among U.S. soldiers in 2005 than in any other year since 1996 (Figure 1).

As in the recent past, most soldiers diagnosed with malaria in 2005 were males (93%), younger than 30 (78%), white non-Hispanic (85%), and in the active component (98%) (Table 1).

As in the recent past, infections presumably acquired in Korea (n=18) and Central Asia/Middle East (n=16) accounted for most of the cases (Table 2). In 2005 compared to 2004, there were six fewer cases presumably acquired in Korea and two more in Central Asia/Middle East (Figure 2). Most Korea-acquired cases presented during the summer-early fall, while cases presumably acquired in Central Asia/Middle East presented throughout the year (Figure 2).

Finally, in 2005, malaria cases were hospitalized in/reported from 13 different medical facilities located in the continental United States, Alaska, Hawaii, Korea, and Germany. Of these, only 5 reported more than one case: Tripler Army Medical Center, Hawaii (n=10); 121st General Hospital, Seoul, Korea (n=9); Landstuhl Regional Medical Center, Germany (n=5); Madigan Army Medical Center, Fort Lewis, Washington (n=5); and Evans Army Community Hospital, Fort Carson, Colorado (n=3). Of note, half of the cases presumably acquired in Korea and all of the cases presumably acquired in Central Asia/Middle East were reported from medical facilities outside of the geographic regions in which the infections were presumably acquired (Table 2).

Editorial comment: In the past 10 years, the peak of malaria cases among soldiers was in 2003; since then,

Figure 1. Malaria cases by plasmodium species and year, U.S. Army, 1996-2005.

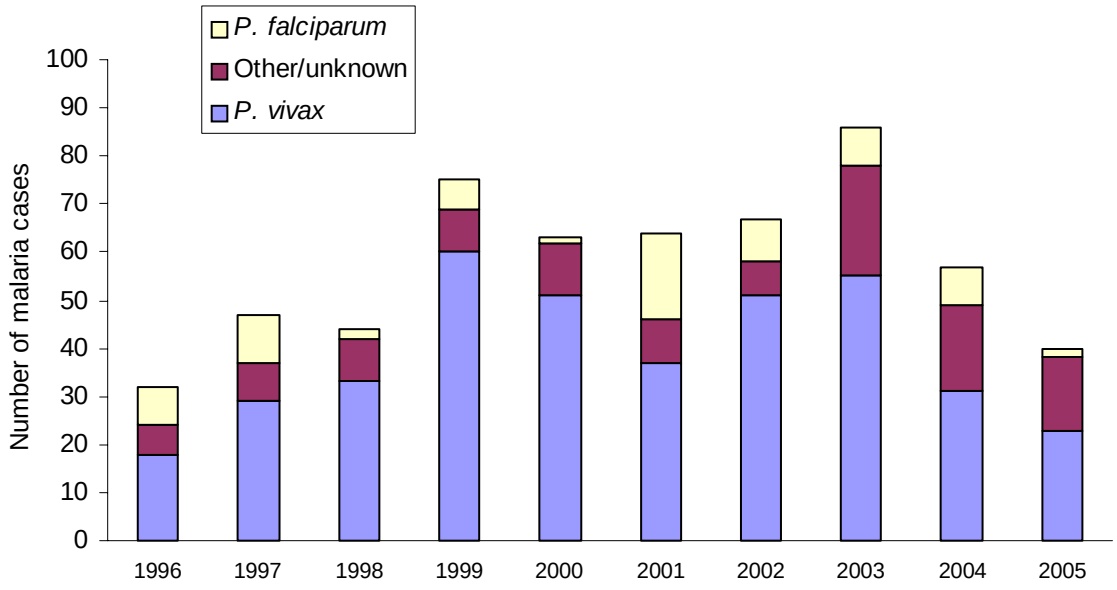


Table 1. Demographic characteristics of soldiers, U.S. Army, who were diagnosed/reported with malaria, by species, 2005

				Total	
	P. vivax	*P. falciparum*	Other/unknown	Number	% of total
Total	*23*	*2*	*15*	*40*	*100.0*
Gender					
Male	23	2	12	37	92.5
Female	0	0	3	3	7.5
Age group					
<20	1	0	0	1	2.5
20-24	12	0	12	24	60.0
25-29	5	1	1	7	17.5
30-34	4	0	2	6	15.0
35-39	1	1	0	2	5.0
40+	0	0	0	0	0.0
Race/ethnicity					
White, non-Hispanic	20	1	13	34	85.0
Black, non-Hispanic	0	1	0	1	2.5
Hispanic	1	0	1	2	5.0
Other	2	0	1	3	7.5
Component					
Active	23	1	15	39	97.5
Guard	0	0	0	0	0.0
Reserve	0	1	0	1	2.5

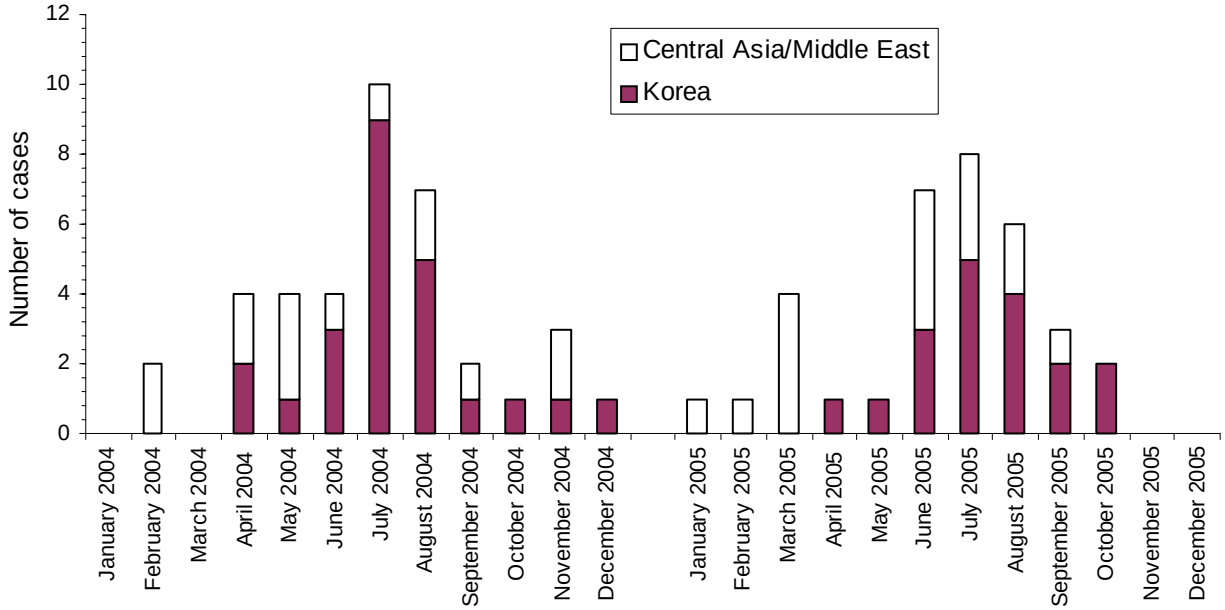
there have been sharp declines (approximately 30% per year). In turn, in 2005, there were fewer cases of malaria among U.S. soldiers than in any other year since 1996.

As in the recent past, more cases of malaria among soldiers were presumably acquired in Korea than in any other location. Of note, the recent decline in malaria cases overall among U.S. soldiers reflects the recent experience of residents of the Republic of Korea. Since the initiation in 2001 of a government directed malaria control program, reported cases in the Republic of Korea have declined by approximately 30% per year.[11]

For several reasons, most cases of malaria among U.S. soldiers in 2005 were diagnosed at medical facilities remote from malaria endemic areas.[7,12,13] For example, *P. vivax* infections acquired in Korea often have long latency periods.[12,13] In turn, many infections acquired during summer-fall transmission seasons in Korea clinically present months later at military or civilian facilities outside of Korea. In addition, clinical manifestations of *P. vivax* infections acquired in Central Asia/Middle East may be suppressed until chemoprophylaxis that is taken routinely while deployed is terminated following deployment.[9] Also, some *P. vivax* infections acquired in Central Asia (e.g., Afghanistan) have inherently long latency periods.[14] Providers of medical care to U.S. soldiers—during all seasons and in all locations—should be alert for U.S. servicemembers who present with clinical syndromes consistent with malaria who traveled to or were assigned/deployed to malaria-endemic areas (especially Korea and/or Afghanistan).

Finally, all soldiers at risk of malaria (and other arthropod-transmitted infections) should be informed of the nature of the risk; trained, equipped, and supplied to conduct indicated countermeasures; and monitored to ensure compliance. Personal protective measures against malaria include the proper wear of permethrin-impregnated uniforms; the use of bed nets and military-issued DEET-containing insect repellent; and compliance with prescribed chemoprophylactic drugs before, during, and after times of exposure in malarious areas.

Figure 2. Hospitalized/reported cases of malaria among U.S. soldiers, by location of acquisition of infection, by month of clinical presentation/diagnosis, January 2004-December 2005.



Analysis by Jackson Gustave, MPH, Analysis Group, Army Medical Surveillance Activity.

References

1. World Health Organization (WHO) Roll Back Malaria (RBM) Department. Fact sheet: What is malaria? http://www.rbm.who.int/cmc_upload/0/000/015/372/RBMInfosheet_1.htm. (cited 6 March 2006).
2. Ognibene, AJ, Barrett, O. Malaria: Introduction and background, In: Internal medicine in Vietnam (vol II): General medicine and infectious diseases. Ed: Ognibene, AJ, Barrett, O. Office of the Surgeon General and Center of Military History, US Army, Washington, DC, 1982, 271-8.
3. Shanks GD, Karwacki JJ. Malaria as a military factor in Southeast Asia. *Mil Med* 1991;156(12):684-6.
4. Feighner BH, Pak SI, Novakoski, WL, Kelsey LL, Strickman D. Reemergence of *Plasmodium vivax* malaria in the Republic of Korea. *Emerg Infect Dis* 1998; 4(2):295-7.
5. Strickman D, Miller ME, Kelsey LL, et al. Evaluation of the malaria threat at the multipurpose range complex, Yongp'yong, Republic of Korea. *Mil Med* 1999; 164(9):626-9.
6. Lee JS, Lee WJ, Cho SH, Ree H. Outbreak of vivax malaria in areas adjacent to the demilitarized zone, South Korea, 1998. *Am J Trop Med Hyg* 2002; 66(1):13-7.
7. Johnson KE. Malaria, US Army, 2003. *MSMR* 2004; 10(1):6-8.
8. Wallace MR, Hale BR, Utz GC, et al. Endemic infectious diseases of Afghanistan. *Clin Infect Dis*. 2002 Jun 15;34(Suppl 5):S171-207.
9. Kotwal RS, Wenzel RB, Sterling RA, et al. An outbreak of malaria in US Army Rangers returning from Afghanistan. *JAMA*. 2005 Jan 12;293(2):212-6.
10. World Health Organization (WHO) Rollback Malaria (RBM) Department. World Malaria Report 2005. Country profile: Iraq. < www.rbm.who.int/wmr2005/profiles/iraq.pdf > (cited: 7 March 2006).
11. World Health Organization (WHO) Rollback Malaria (RBM) Department. World Malaria Report 2005. Country profile: Republic of Korea. < www.rbm.who.int/wmr2005/profiles/republicofkorea.pdf > (cited: 7 March 2006).
12. Petruccelli BP, Feighner BH, Craig SC, Kortepeter MG, Livingston R. Late presentations of vivax malaria of Korean origin, multiple geographic sites. *MSMR* 1998;4(5)2-3,8-10.
13. Army Medical Surveillance Activity. *P. vivax* malaria acquired by US soldiers in Korea: acquisition trends and incubation period characteristics, 1994-2000. *MSMR* 2001;7(1):7-8.
14. Sergiev VP, Baranova AM, Orlov VS, et al. Importation of malaria into the USSR from Afghanistan, 1981-89. *Bull WHO*. 1993;71(3-4):385-8.

Table 2. Reports/diagnoses of malaria among soldiers, U.S. Army, by presumed location of infection acquisition and location of hospitalization/case report, 2005

	Presumed location of infection acquisition					
Location of hospitalization/case report	Central Asia/ Middle East	Korea	Central/ South America	Africa	Unknown	Total
Fort Campbell, KY	0	1	0	0	0	1
Fort Carson, CO	0	3	0	0	0	3
Fort Knox, KY	0	1	0	0	0	1
Fort Leonard Wood, MO	0	0	0	1	0	1
Fort Lewis, WA	5	0	0	0	0	5
Fort Polk, LA	0	1	0	0	0	1
Fort Sam Houston, TX	0	1	0	0	0	1
Fort Shafter, HI	9	0	0	0	1	10
Fort Wainwright, AK	1	0	0	0	0	1
Fort Benning, GA	0	0	1	0	0	1
Washington, DC	0	0	0	1	0	1
Germany	1	2	0	0	2	5
Korea	0	9	0	0	0	9
Total	16	18	1	2	3	40

Pneumonia and Influenza among Non-military Beneficiaries of the U.S. Military Health System, January 2001-December 2004

The influenza pandemic of 1918-9 is often used as a model during planning for the next influenza pandemic.[1,2] In the fall of 1918, numerous widely dispersed locations were attacked by influenza almost simultaneously.[3] Local epidemics were characterized by sudden onsets, high attack rates, and large numbers of viral and secondary bacterial pneumonias with fulminant clinical expressions.[3,4] The concentration of deaths among previously healthy young adults was an unusual and concerning characteristic of the pandemic.[1,2]

The recent emergence and international spread of H5N1 influenza among domestic and migratory avian species and of highly virulent avian influenza among humans have heightened awareness of the potential effects of and stimulated plans to counter the next influenza pandemic.[1,2] The timely detection and characterization of initial ("herald") attacks of the next influenza pandemic are important components of pandemic influenza preparedness.

To detect perturbations from baseline rates and/or usual clinical severities of "pneumonia and influenza" among U.S. Military Health System beneficiaries, it is essential to know relevant background experiences. The last *MSMR* summarized recent experiences of active U.S. service members in relation to "pneumonia and influenza." In this report, we summarize recent experiences of other ("non-military") beneficiaries of the Military Health System in relation to "pneumonia and influenza."

Methods: The surveillance period was defined as 1 January 2001 through 31 December 2004. The surveillance population included all individuals who were beneficiaries of the Military Health System but not active members of the U.S. Armed Forces. Cases were ascertained from records in the Defense Medical Surveillance System.

A case of "pneumonia and influenza" was defined as a medical encounter with a diagnosis (in any position) of "pneumonia and influenza" (ICD-9-CM codes: 480-487). Incident cases were enumerated separately for hospitalized (all episodes) and ambulatory (only one episode per individual per 30 day period) cases.

A case of "severe pneumonia and influenza" was defined as a hospitalization with a discharge diagnosis (in any position) of "pneumonia and influenza" (ICD-9-CM codes: 480-487) *plus* one or more of the following diagnosis/procedure codes: "acute respiratory failure" (ICD-9-CM: 518.81), "other disease of the respiratory system" (includes ARDS): (ICD-9-CM: 518.82), "empyema" (ICD-9-CM: 510), "abscess of lung" (ICD-9-CM: 513.0), "other continuous mechanical ventilation" (ICD-9-CM: 96.7).

Results:

Ambulatory cases: During the surveillance period, there were 806,637 incident outpatient diagnoses of "pneumonia and influenza" among non-active military beneficiaries of the Military Health System (Table 1). The mean number of cases per month was 16,805. During the period, there was approximately an 11-fold difference between the fewest (July 2001: n=5,536) and the most (December 2003: n=60,410) cases in a month (Figure 1). From year to year, the fewest cases were consistently in July, and the most were in December, January, or February (Figure 1).

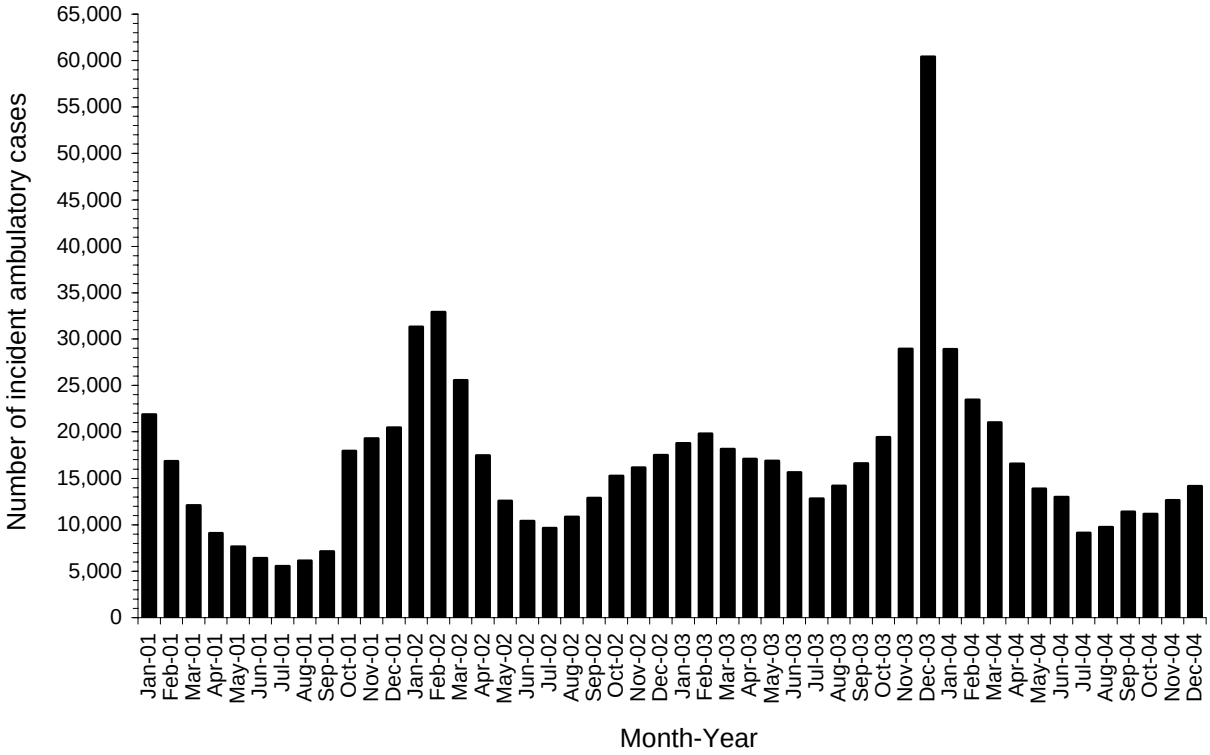
Overall, there were nearly equal numbers of cases among males and females (Table 1). In relation to age, nearly half of all cases were older than 60 and approximately one-sixth were younger than 5 (Table 1). Seasonal trends in numbers of cases were similar across all age groups (data not shown).

H*ospitalized cases*: During the surveillance period, there were 166,685 hospitalizations of non-active military beneficiaries for "pneumonia and influenza" (Table 1). The mean number of hospitalizations per month was 3,473. Seasonally, the fewest pneumonia/influenza-related hospitalizations were consistently in mid- to late summer (June-September) and the most were in winter (December-March) (Figure 2). During the period, there was nearly a 9-fold difference between the fewest (July 2001: n=985) and the most (December 2003: n=8,742) hospitalizations in a month (Figure 2).

Table 1. Reports/diagnoses of influenza/pneumonia, by presumed clinical severity, among beneficiaries (other than active military) of the U.S. Military Health System, by age group and gender, 1 January 2001-December 2004

	Ambulatory cases		*Hospitalized cases*		*"Severe" cases*	
	Number	% of total	Number	% of total	Number	% of total
Total	806,637	100.0	166,685	100.0	19,936	100.0
Gender						
Female	408,320	50.6	79,208	47.5	9,057	45.4
Male	398,312	49.4	87,477	52.5	10,879	54.6
Age group						
< 5	130,817	16.2	12,524	7.5	525	2.6
5-9	34,273	4.2	1,700	1.0	73	0.4
10-14	25,204	3.1	1,642	1.0	124	0.6
15-19	25,168	3.1	2,125	1.3	174	0.9
20-29	25,270	3.1	2,270	1.4	207	1.0
30-39	41,783	5.2	5,044	3.0	596	3.0
40-49	55,621	6.9	3,220	1.9	130	0.7
50-59	66,604	8.3	12,656	7.6	1,754	8.8
60 +	401,897	49.8	125,504	75.3	16,353	82.0

Figure 1. Incident diagnoses of influenza/pneumonia during ambulatory visits, among beneficiaries (other than active military) of the U.S. Military Health System, 1 January 2001-December 2004.



Beneficiaries older than 60 accounted for three-fourths of all pneumonia/influenza-related hospitalizations during the period (Table 1). The proportion of pneumonia/influenza-related hospitalizations accounted for by patients older than 60 remained stable from month to month (range of percentages of pneumonia/influenza-related hospitalizations attributable to patients >60 years old, by month: 74-84%) (Figure 4) and did not significantly vary by season.

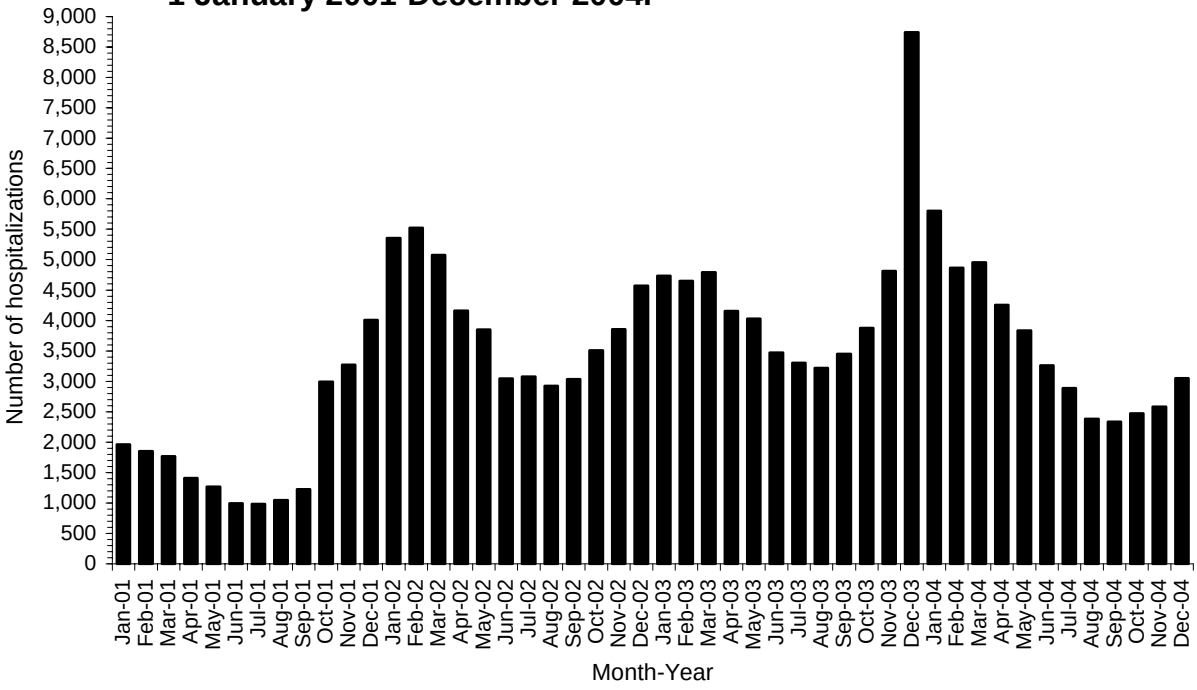
S*evere cases*: During the surveillance period, there were 19,936 hospitalizations of non-active military beneficiaries for "severe pneumonia/influenza" (Table 1). The mean number of severe cases per month was 415. The fewest and most cases in any month were in August 2001 (n=111) and December 2003 (n=1,084), respectively (Figure 3). There was distinct seasonality in the incidence of severe cases, with relative peaks each winter (December-February) and relative troughs each summer-fall (Figure 3). The proportion of severe cases accounted for by patients older than 60 was relatively stable from month to month (range:79-89%) (Figure 4).

Relationships between incident ambulatory, hospitalized, and severe cases: The ratio of ambulatory-to-hospitalized cases of pneumonia/influenza overall was 4.8-to-1. The ratio was relatively stable from month to month with a notable spike in December 2003 (range of ratios of ambulatory-to-hospitalized cases, by month: 3.1-6.9; linear correlation, incident ambulatory cases per month = 4.91 x hospitalized cases per month, R^2=0.75).

The ratio of hospitalized-to-severe cases of pneumonia/influenza overall was 8.4-to-1. The ratio was remarkably stable from month to month with no clear peaks, troughs, or seasonal variations (range of ratios of hospitalized-to-severe cases, by month: 7.0-9.7; linear correlation, hospitalizations for pneumonia/influenza per month = 8.27 x severe cases per month, R^2=0.96).

Editorial comment: One finding of this summary should be interpreted with caution. Sharp increases in medical encounters (including pneumonia/influenza-related) among elderly beneficiaries in the fall of 2001 were attributable to a great extent to the TRICARE for Life program which began on 1

Figure 2. Hospitalizations for influenza/pneumonia, among beneficiaries (other than active military) of the U.S. Military Health System, 1 January 2001-December 2004.



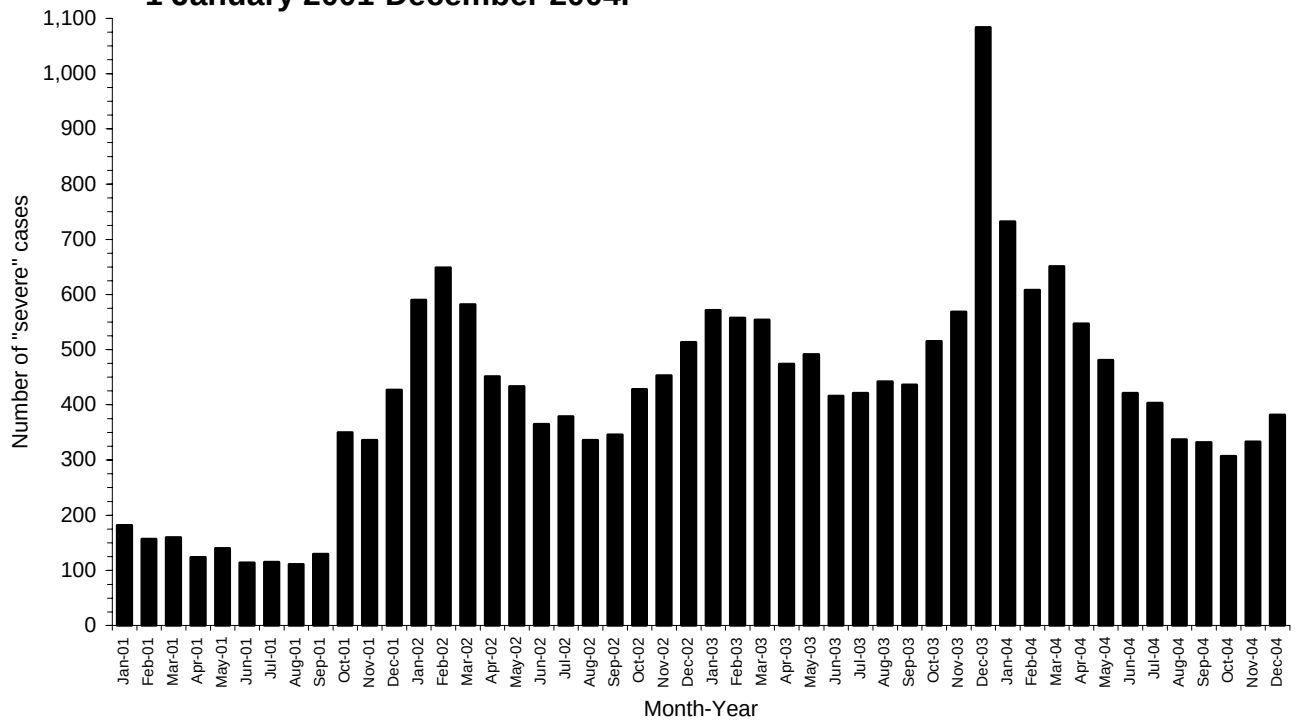
October 2001. Prior to then, beneficiaries older than 65 received their medical care through programs (e.g., Medicare) other than the U.S. Military Health System.

Typically, during influenza epidemics in immunologically susceptible populations, there are sudden increases in rates of acute febrile respiratory illnesses and complicating pneumonias. Most influenza cases in previously healthy adults are temporarily debilitating and self-limited. However, some cases are severe (e.g., acute respiratory distress syndrome, secondary bacterial pneumonia) and life threatening and require intensive medical care. Generally, the youngest and oldest in affected populations are at greatest risk of severe and life threatening clinical manifestations of influenza. In contrast, an influenza pandemic caused by a highly virulent strain is likely to be manifested by multiple, nearly simultaneous, explosive outbreaks of acute febrile respiratory illnesses with fulminant clinical courses in age groups (i.e., young and middle aged adults) normally at low risk of severe influenza-related disease.[5]

Given these expectations, there are several findings of this report that may be relevant regarding pandemic influenza preparedness. First, during non-pandemic periods, approximately 75-85% of all influenza/pneumonia-related hospitalizations, in general, and "severe" cases in particular, affect adults older than 60. It is likely that during an influenza pandemic, the proportion of influenza/pneumonia-related hospitalizations that will be attributable to young and middle aged adults will sharply increase and may be detectable.[5] Second, the ratio of hospitalized-to-severe cases of influenza/pneumonia overall has been remarkably stable. Of note, for example, there has been relatively little seasonal variability in the ratio of hospitalized-to-severe cases overall. It is likely, however, that during an influenza pandemic, there will be sudden, widespread, and readily apparent increases in the proportions of hospitalized cases of pneumonia/influenza that are severe (e.g., ARDS, respiratory failure, require mechanical ventilation support).

In summary, in regard to pandemic preparedness, public health officials and clinical care providers at military installations should be vigilant for sudden increases in numbers of influenza/pneumonia cases in general, changes in age

Figure 3. Hospitalized cases of influenza/pneumonia with "severe" clinical manifestations, among beneficiaries (other than active military) of the U.S. Military Health System, 1 January 2001-December 2004.

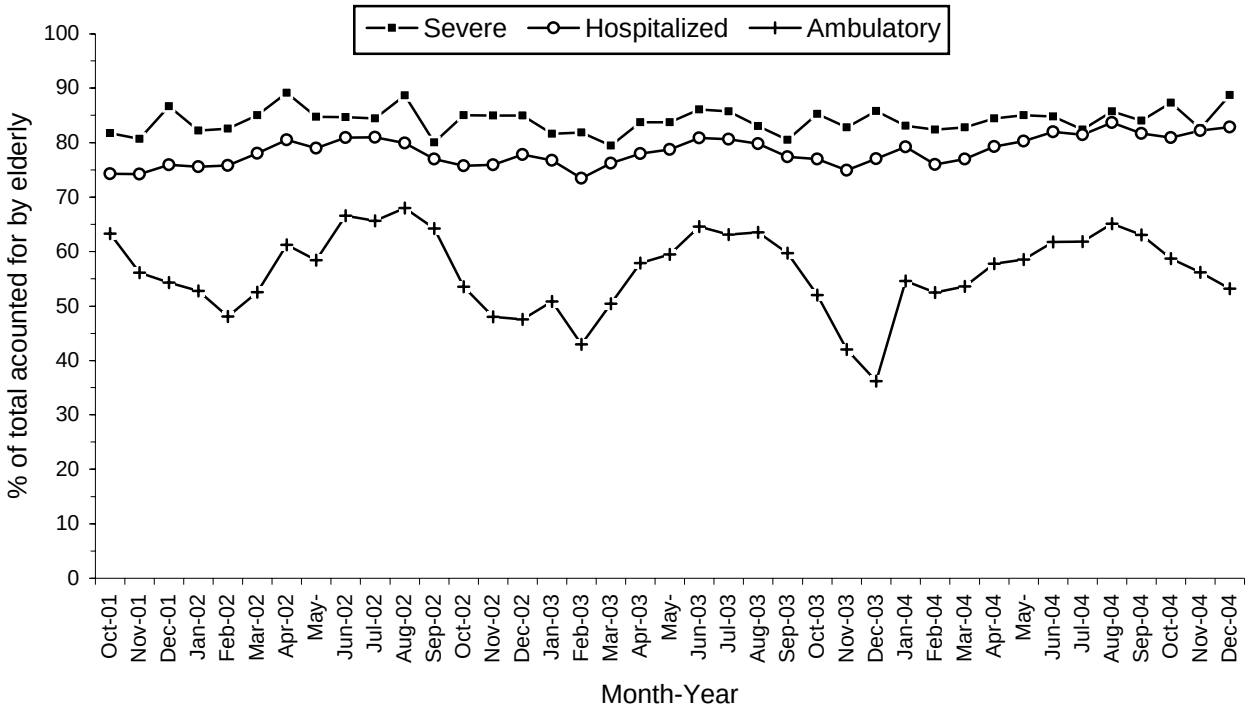


distributions of pneumonia/influenza cases that require hospitalization and have severe clinical manifestations (i.e., higher proportions of young and middle aged adults), and increases in proportions of hospitalized cases of pneumonia/influenza that have "severe" clinical expressions. The natures, magnitudes, and etiologies of all outbreaks of influenza/pneumonia in general and all clusters of "severe" cases, especially among young and middle aged adults, should be expeditiously and thoroughly investigated.

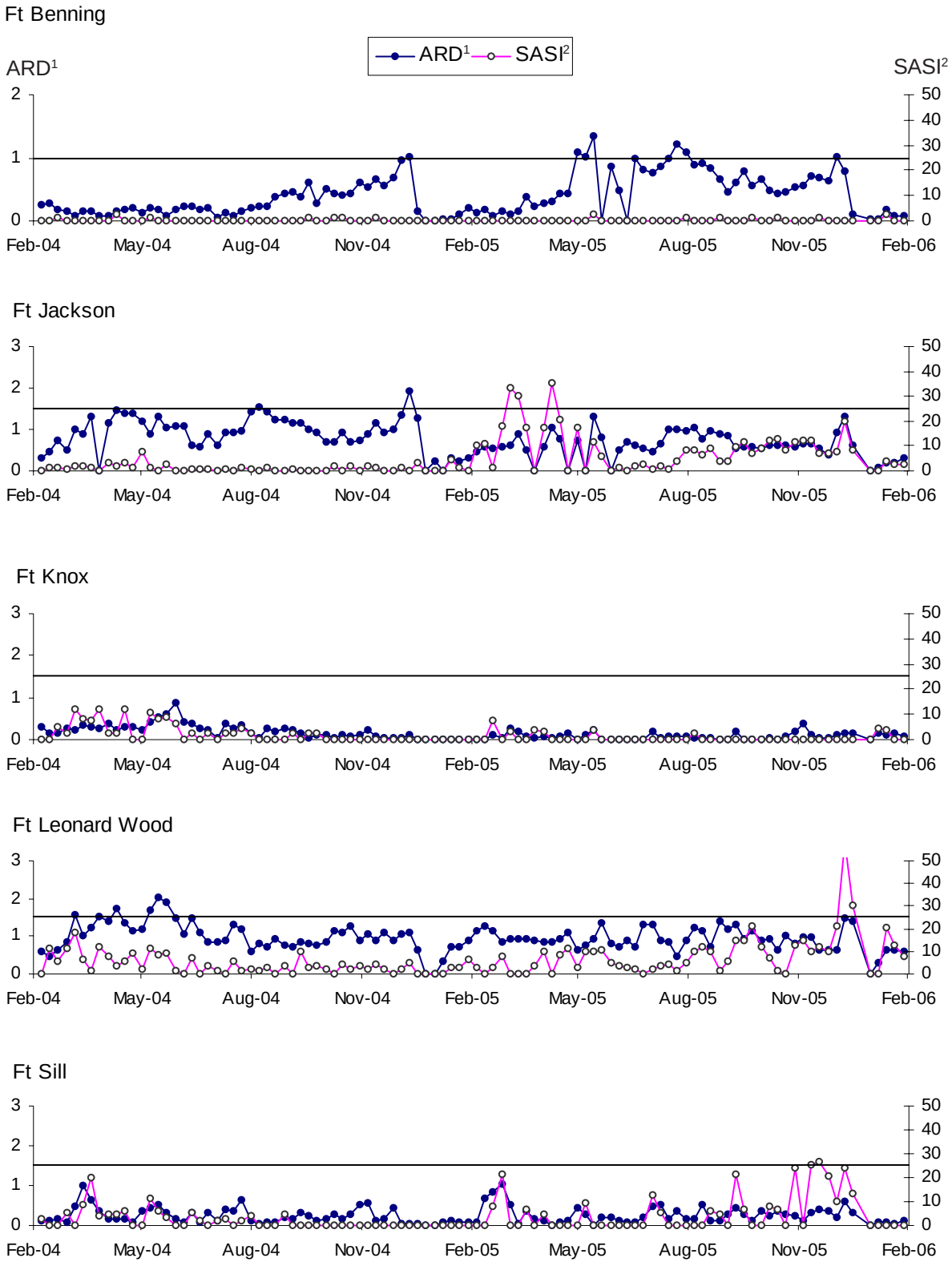
References

1. Osterholm MT. Preparing for the next pandemic. *N Engl J Med.* 2005 May 5;352(18):1839-42.
2. Bartlett JG, Hayden FG. Influenza A (H5N1): will it be the next pandemic influenza? Are we ready? *Ann Intern Med.* 2005 Sep 20;143(6):460-2.
3. Sopor GA. The pandemic in the Army camps. *JAMA* 1918;71(23):1899-1909.
4. Conner LA. The symptomatology and complications of influenza. *JAMA.* 1919 Aug 2;73(5):321-5.
5. Simonsen L, Clarke MJ, Schonberger LB, Arden NH, Cox NJ, Fukuda K. Pandemic versus epidemic influenza mortality: a pattern of changing age distribution. *J Infect Dis.* 1998 Jul;178(1):53-60.

Figure 4. Proportion of influenza/pneumonia cases accounted for by beneficiaries 60 years and older, by presumed clinical severity, October 2001-December 2004.



Acute respiratory disease (ARD) and streptococcal pharyngitis (SASI), Army basic training centers, by week through January 31, 2005



[1] ARD rate = cases per 100 trainees per week
[2] SASI (Strep ARD surveillance index) = (ARD rate)x(rate of Group A beta-hemolytic strep)
[3] ARD rate >=1.5 or SASI>=25.0 for 2 consectutive weeks indicates an "epidemic"

Update: Pre- and Post-deployment Health Assessments, US Armed Forces, January 2003-December 2005

The June 2003 issue of the *MSMR* summarized the background, rationale, policies, and guidelines related to pre-deployment and post-deployment health assessments of servicemembers.[1-10] Briefly, prior to deploying, the health of each servicemember is assessed to ensure his/her medical fitness and readiness for deployment. At the time of redeployment, the health of each servicemember is again assessed to identify medical conditions and/or exposures of concern to ensure timely and comprehensive evaluation and treatment.

Completed pre- and post-deployment health assessment forms are routinely sent (in hard copy or electronic form) to the Army Medical Surveillance Activity (AMSA) where they are archived in the Defense Medical Surveillance System (DMSS).[11] In the DMSS, data recorded on pre- and post-deployment health assessments are integrated with data that document demographic characteristics, military experiences, and medical encounters of all servicemembers (e.g., hospitalizations, ambulatory visits, immunizations).[11] The continuously expanding DMSS database can be used to monitor the health of servicemembers who participated in major overseas deployments.[11-13]

The overall success of deployment force health protection efforts depends at least in part on the completeness and quality of pre- and post-deployment health assessments. This report summarizes characteristics of servicemembers who completed pre-and post-deployment forms since 1 January 2003, responses to selected questions on pre- and post-deployment forms, and changes in responses of individuals from pre-deployment to post-deployment.

Methods: For this update, the DMSS was searched to identify all pre- and post-deployment health assessments (DD Form 2795 and DD Form 2796, respectively) that were completed after 1 January 2003.

Results: From 1 January 2003 to 31 December 2005, 1,180,657 pre-deployment health assessments and 1,191,953 post-deployment health assessments were

Table 1. Total pre- and post-deployment health assessments, by month and year, US Armed Forces, January 2003-December 2005

	Pre-deployment		Post-deployment	
	No.	%	No.	%
Total	**1,180,657**	**100.0**	**1,191,953**	**100.0**
2003				
January	69,389	5.9	6,219	0.5
February	110,571	9.4	5,077	0.4
March	69,838	5.9	6,752	0.6
April	37,598	3.2	19,349	1.6
May	12,881	1.1	92,812	7.8
June	14,414	1.2	65,374	5.5
July	18,046	1.5	52,868	4.4
August	16,511	1.4	35,142	2.9
September	12,792	1.1	32,433	2.7
October	24,166	2.0	27,036	2.3
November	19,682	1.7	21,528	1.8
December	36,145	3.1	22,240	1.9
2004				
January	70,200	5.9	39,711	3.3
February	39,192	3.3	32,221	2.7
March	22,837	1.9	65,987	5.5
April	19,925	1.7	44,222	3.7
May	27,794	2.4	17,817	1.5
June	24,513	2.1	28,292	2.4
July	22,775	1.9	24,216	2.0
August	34,258	2.9	22,903	1.9
September	31,637	2.7	24,251	2.0
October	34,972	3.0	15,637	1.3
November	35,635	3.0	21,941	1.8
December	37,777	3.2	26,727	2.2
2005				
January	34,043	2.9	50,682	4.3
February	23,494	2.0	68,636	5.8
March	20,511	1.7	52,881	4.4
April	26,686	2.3	18,878	1.6
May	18,601	1.6	20,876	1.8
June	25,045	2.1	18,993	1.6
July	21,245	1.8	16,579	1.4
August	46,141	3.9	29,046	2.4
September	33,686	2.9	38,006	3.2
October	35,788	3.0	36,886	3.1
November	33,074	2.8	37,220	3.1
December	18,795	1.6	52,515	4.4

completed at field sites, shipped to AMSA, and integrated in the DMSS database (Table 1).

In general, the distributions of self-assessments of "overall health" were similar among pre- and post-deployment form respondents (Figure 1). For example, both prior to and after deployment, the most frequent descriptor of "overall health" was "very good." Of note, however, relatively more pre- (33%) than post- (23%) deployment respondents assessed their overall health as "excellent"; while more post- (41%) than pre- (25%) deployment respondents assessed their overall health as "good," "fair," or "poor" (Figure 1).

Among servicemembers (n=600,576) who completed both a pre- and a post-deployment health assessment, nearly half (45%) chose the same descriptor of their overall health before and after deploying (Figures 2, 3). Of those (n=300,836) who changed their assessments from pre- to post-deployment, approximately three-fourths (75%) changed by a single category (on a five category scale) (Figure 3); and of those who changed by more than one category, nearly 5-times as many indicated a decrement in overall health (n= 67,476; 11% of all respondents) as an improvement (n=13,807; 2% of all respondents) (Figure 3).

On post-deployment forms, approximately 21% of active and 39% of Reserve component respondents reported "medical/dental problems" during deployment (Table 2). Among active component respondents, "medical/dental problems" were more frequently reported by soldiers and Marines than by members of the other Services; however, among Reservists, members of the Army, Navy, and Marine Corps reported "medical/dental problems" at similiar rates, which were more than twice the rate in the Air Force (Table 2).

Approximately 4% and 6% of active and Reserve component respondents, respectively, reported "mental health concerns." "Mental health concerns" were reported relatively more frequently among soldiers (active: 6%; Reserve: 7%) than members of the other Services (Table 2). From 7% (active component, Navy) to 28% (active component, Army) of post-deployment forms documented that "referrals" were indicated (Table 2); and 87% and 82% of all active and Reserve component respondents, respectively, had hospitalizations and/or medical encounters within 6 months after documented post-deployment referrals (Table 2).

Overall, approximately 16% of all post-deployment forms indicated deployment-related "exposure concerns" (Table 3). The proportion of respondents who reported exposure concerns significantly varied from month to month. In general, however, exposure concern rates increased through calendar year 2003 and were stable or slightly declined thereafter (Figure 4). Also, reports of exposure concerns are relatively higher in the Army than the other services and in the Reserve compared to the active component. Finally, reports of exposure concerns increased monotonically with age (Tables 3, 4).

Editorial comment: Since January 2003, approximately three-fourths of U.S. servicemembers have assessed their overall health as "very good" or "excellent" when they are mobilized and/or prior to deploying overseas; in contrast, approximately 60% have assessed their overall health as "very good" or "excellent" at the end of their deployments. Most of the changes in assessments of overall health from pre-

Figure 1. Percent distributions of self-assessed health status, pre- and post-deployment, US Armed Forces, January 2003-December 2005.

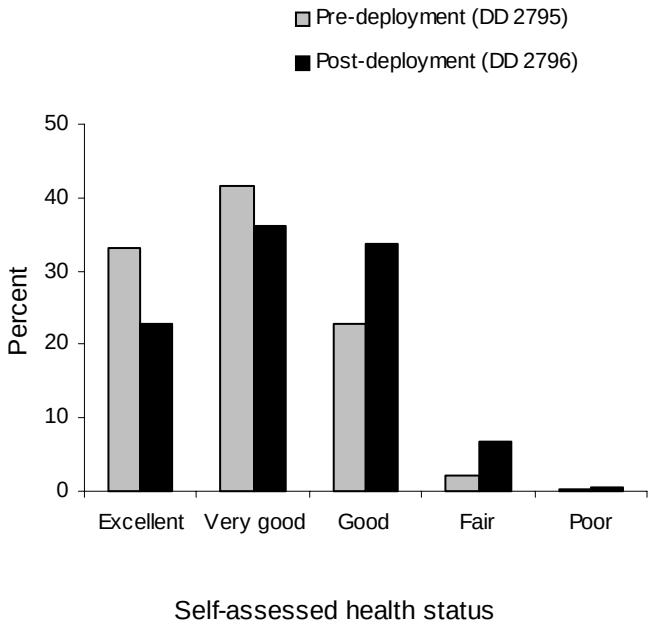


Figure 2. Self-assessed health status on post-deployment form, in relation to self-assessed health status on pre-deployment form, US Armed Forces, January 2003- December 2005.

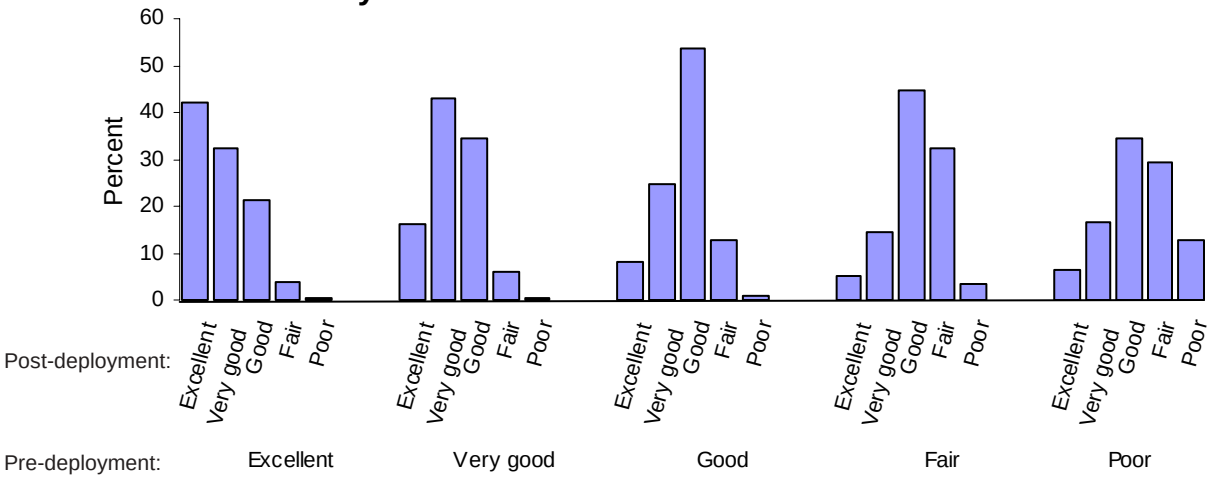


Table 2. Responses to selected questions from post-deployment forms (DD 2796) by service and component, US Armed Forces, January 2003-December 2005

	Army	Navy	Air Force	Marines	Total
Active component					
SMs with DD 2796 at AMSA	**243,080**	**95,045**	**100,120**	**82,114**	**520,359**
Electronic version	70%	3%	61%	6%	46%
General health ("fair" or "poor")	9%	5%	2%	6%	6%
Medical/dental problems during deploy	30%	12%	11%	20%	21%
Currently on profile	10%	2%	2%	3%	6%
Mental health concerns	6%	2%	1%	2%	4%
Exposure concerns	18%	5%	5%	11%	12%
Health concerns	14%	6%	5%	9%	10%
Referral indicated	28%	7%	10%	14%	18%
Medical visit following referral[1]	92%	71%	89%	65%	87%
Post deployment serum[2]	93%	80%	87%	88%	89%
Reserve component					
SMs with DD 2796 at AMSA	**229,973**	**14,670**	**36,500**	**17,845**	**298,988**
Electronic version	65%	16%	48%	9%	57%
General health ("fair" or "poor")	11%	6%	2%	9%	10%
Medical/dental problems during deploy	44%	36%	15%	35%	39%
Currently on profile	15%	4%	2%	3%	12%
Mental health concerns	7%	3%	1%	3%	6%
Exposure concerns	25%	19%	8%	25%	22%
Health concerns	22%	21%	9%	22%	20%
Referral indicated	26%	20%	11%	25%	24%
Medical visit following referral[1]	86%	77%	58%	54%	82%
Post deployment serum[2]	94%	89%	69%	87%	90%

[1] Inpatient or outpatient visit within 6 months after referral.

[2] Only calculated for DD 2796 completed since 1 June 2003.

to post-deployment have been relatively minor (i.e., one category on a 5-category scale). Still, however, more than 10% of all post-deployers have indicated relatively significant declines (i.e., two or more categories) in their overall health from pre- to post-deployment. The findings are not surprising considering the extreme physical and psychological stresses associated with mobilization, overseas deployment, and harsh and dangerous living and working conditions.[14,15]

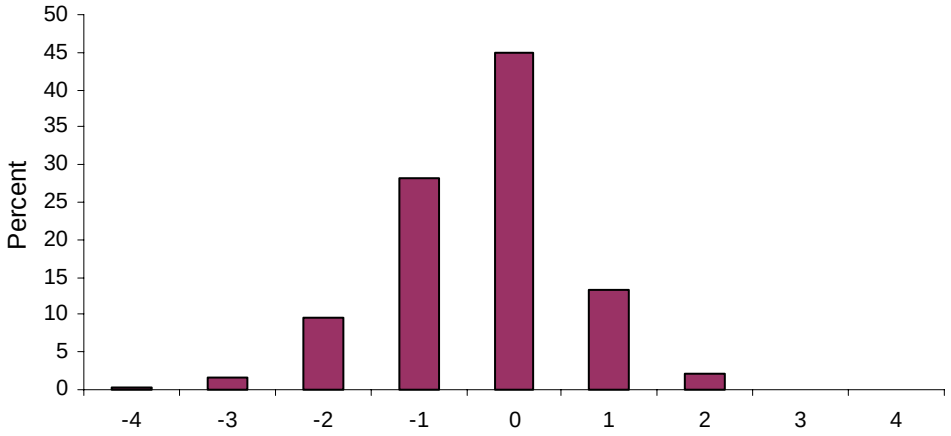
The deployment health assessment process is specifically designed to identify, assess, and follow-up as necessary all servicemembers with concerns regarding their health and/or deployment-related exposures. Overall, for example, approximately one-fifth of all post-deployers had "referral indications" documented on post-deployment health assessments; and of those, most had documented outpatient visits and/or hospitalizations within 6 months after they returned.

Of interest, "exposure concerns" among post-deploying respondents significantly vary from month to month. Overall prevalences of exposure concerns have been relatively stable since the spring of 2004. Exposure concerns are more likely among Reserve compared to active component members. However, among both active and Reserve component members, exposure concerns significantly increase with age. Of note, in both components, servicemembers older than 40 are approximately twice as likely as those younger than 20 to report exposure concerns.

References

1. Medical readiness division, J-4, JCS. Capstone document: force health protection. Washington, DC. Available at: < http://www.dtic.mil/jcs/j4/organization/hssd/fhpcapstone.pdf >.
2. Brundage JF. Military preventive medicine and medical surveillance in the post-cold war era. *Mil Med*. 1998 May;163(5):272-7.
3. Trump DH, Mazzuchi JF, Riddle J, Hyams KC, Balough B. Force health protection: 10 years of lessons learned by the Department of Defense. *Mil Med.* 2002 Mar;167(3):179-85.
4. Hyams KC, Riddle J, Trump DH, Wallace MR. Protecting the health of United States military forces in Afghanistan: applying lessons learned since the Gulf War. *Clin Infect Dis.* 2002 Jun 15;34(Suppl 5):S208-14.
5. DoD instruction 6490.3, subject: Implementation and application of joint medical surveillance for deployments. 7 Aug 1997.
6. 10 USC 1074f, subject: Medical tracking system for members deployed overseas. 18 Nov 1997.
7. ASD (Health Affairs) memorandum, subject: Policy for pre- and post-deployment health assessments and blood samples (HA policy: 99-002). 6 Oct 1998.

Figure 3. Distribution of changes in self-assessed health statuses as reported on pre-and post-deployment forms, US Armed Forces, January 2003-December 2005.



Change in self-assessment of overall health status, pre- to post-deployment, calculated as: post deployment response - pre-deployment response, using the following scale for health status: 1="poor"; 2="fair"; 3="good"; 4="very good"; and 5="excellent".

8. ASD (Health Affairs) memorandum, subject: Updated policy for pre- and post-deployment health assessments and blood samples (HA policy: 01-017). 25 Oct 2001.
9. JCS memorandum, subject: Updated procedures for deployment health surveillance and readiness (MCM-0006-02). 1 Feb 2002.
10. USD (Personnel and Readiness) memorandum, subject: Enhanced post-deployment health assessments. 22 Apr 2003.
11. Rubertone MV, Brundage JF. The Defense Medical Surveillance System and the Department of Defense Serum Repository: glimpses of the future of comprehensive public health surveillance. *Am J Pub Hlth.* 2002 Dec;92(12):1900-4.
12. Brundage JF, Kohlhase KF, Gambel JM. Hospitalization experiences of U.S. servicemembers before, during, and after participation in peacekeeping operations in Bosnia-Herzegovina. *Am J Ind Med.* 2002 Apr;41(4):279-84.
13. Brundage JF, Kohlhase KF, Rubertone MV. Hospitalizations for all causes of U.S. military service members in relation to participation in Operations Joint Endeavor and Joint Guard, Bosnia-Herzegovina, January 1995 to December 1997. *Mil Med.* 2000 Jul;165(7):505-11.
14. Hyams KC, Wignall FS, Roswell R. War syndromes and their evaluation: from the U.S. Civil War to the Persian Gulf War. *Ann Intern Med.* 1996 Sep 1;125(5):398-405.
15. Hoge CW, Castro CA, Messer SC, McGurk D, Cotting DI, Koffman RL. Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *N Engl J Med*. 2004 Jul 1;351(1):13-22.

Table 3. Reports of exposure concerns on post-deployment health assessments, U.S. Armed Forces, January 2003-December 2005

	Total[1]	Exposure concerns	% with exposure concerns
Total	**863,044**	**137,533**	**15.9**
Component			
Active	539,705	62,998	11.7
Reserve	323,339	74,535	23.1
Service			
Army	512,338	109,219	21.3
Navy	109,297	7,225	6.6
Air Force	141,801	7,683	5.4
Marine Corps	99,608	13,406	13.5
Age (years)			
<20	23,555	1,878	8.0
20-29	458,056	60,767	13.3
30-39	238,706	42,400	17.8
>39	142,708	32,488	22.8
Gender			
Male	766,451	120,510	15.7
Female	96,590	17,023	17.6
Race/ethnicity			
Black non Hispanic	150,407	25,809	17.2
Hispanic	84,590	14,607	17.3
Other	2,012	219	10.9
White non-Hispanic	565,288	87,412	15.5
Grade			
Enlisted	752,915	118,655	15.8
Officer	110,123	18,877	17.1

[1]Totals do not include non-responses/missing data.

Figure 4. Proportion of post-deployment forms that include reports of exposure concerns, U.S. Armed Forces, January 2003-December 2005.

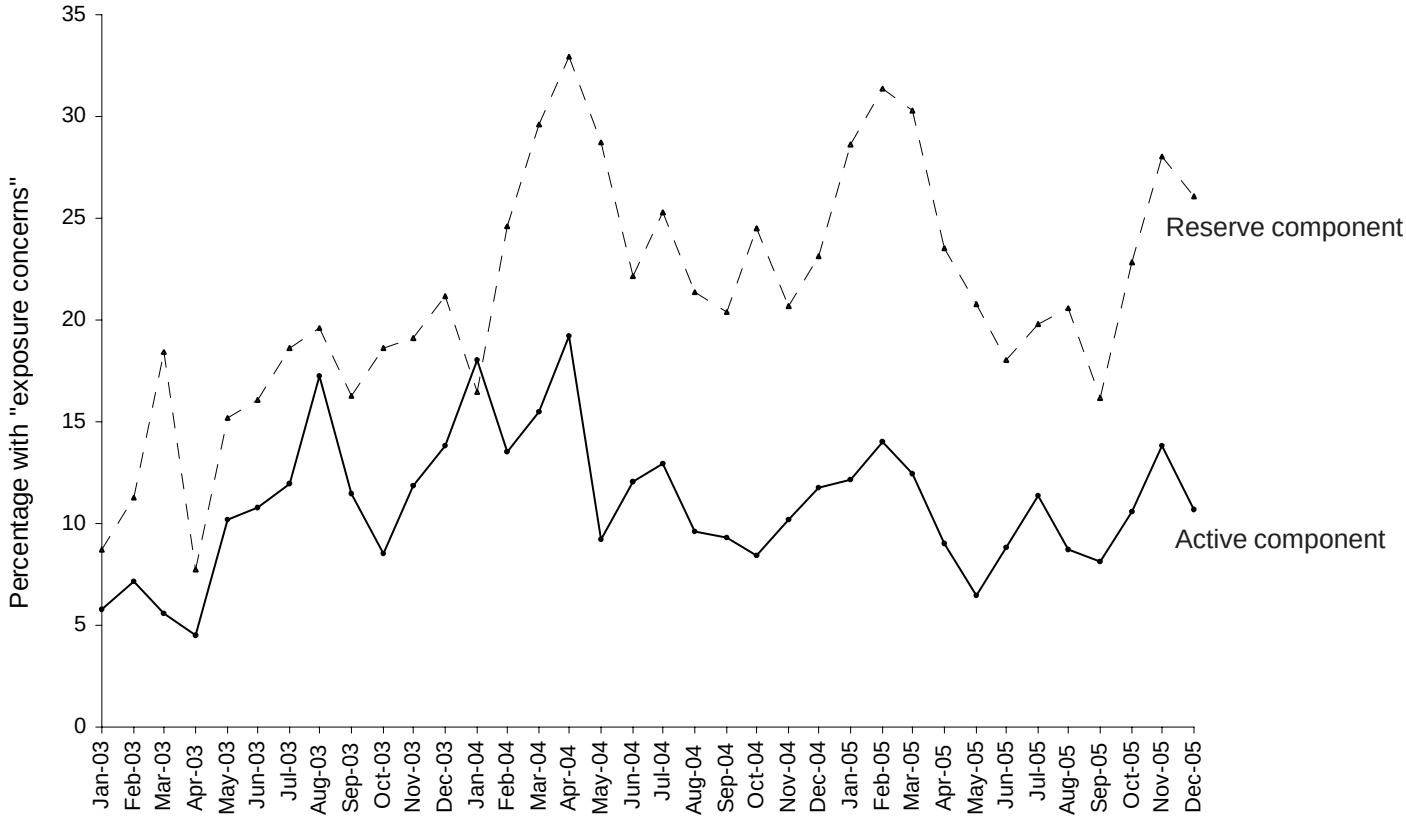
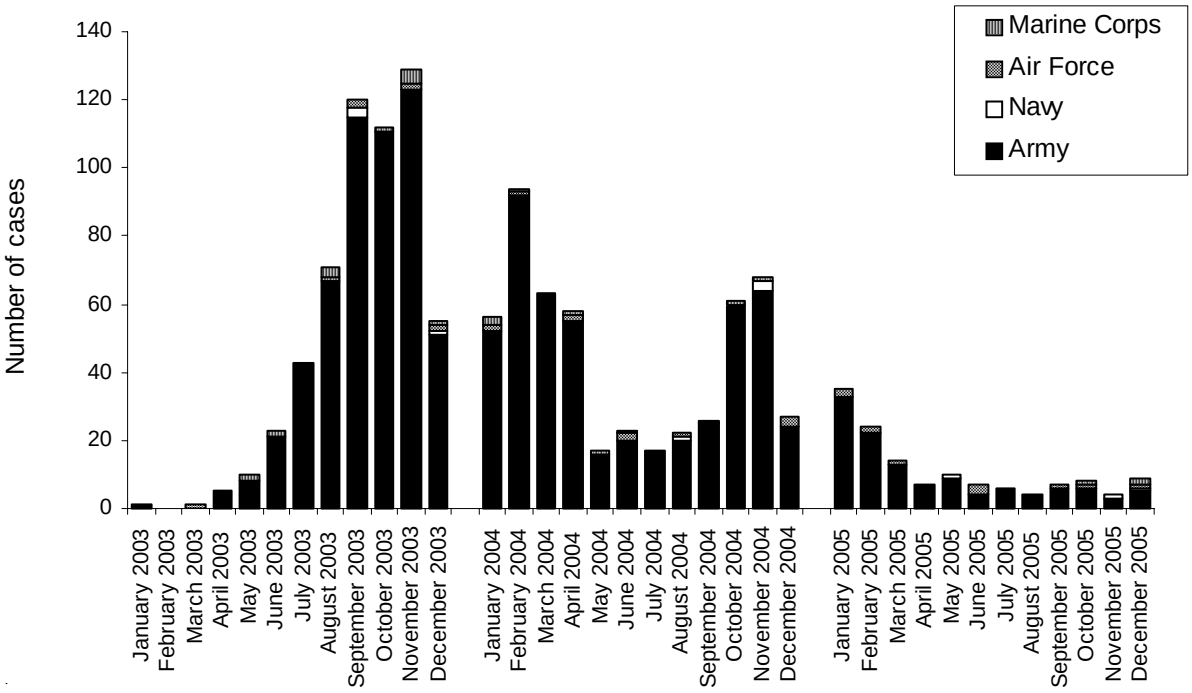


Table 4. Proportion of post-deployment forms that include reports of exposure concerns, by age group and component, U.S. Armed Forces, January 2003-December 2005

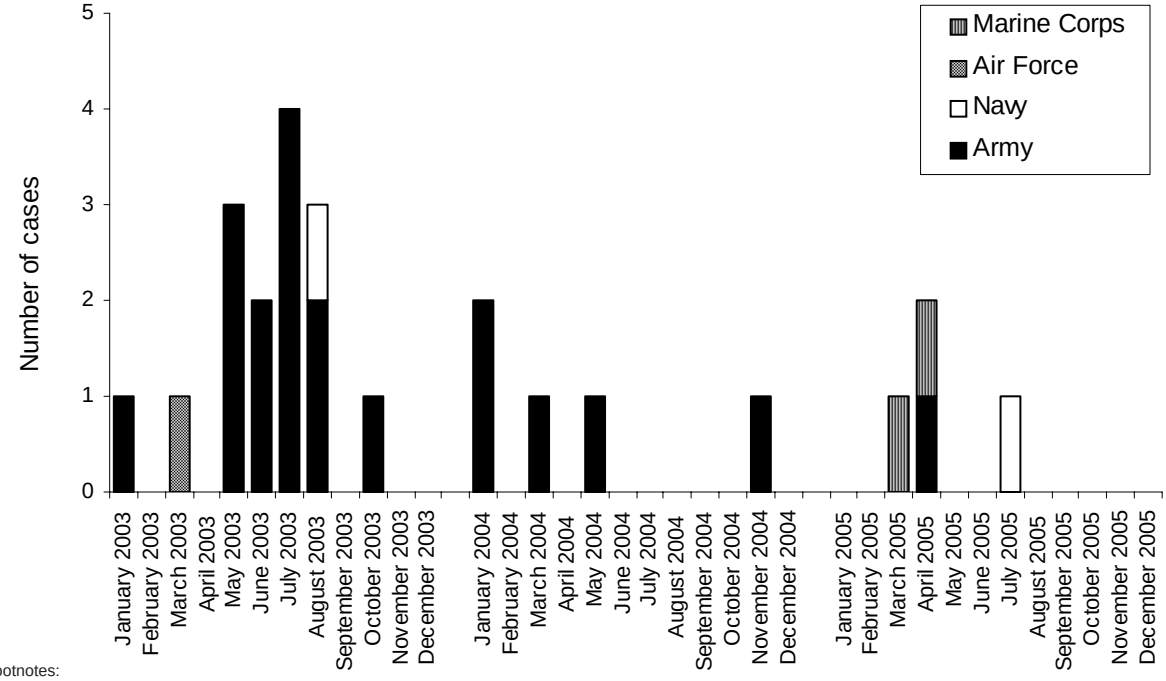
Age group	Active	Reserve
<20	6.6	13.6
20-29	10.6	20.5
30-39	13.4	23.8
>39	16.1	26.0

Deployment related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003-December 2005

Leishmaniasis (ICD-9-CM: 085.0-0.85.5)[1]



Acute respiratory failure/ARDS (ICD-9-CM: 518.81, 518.82)[2]



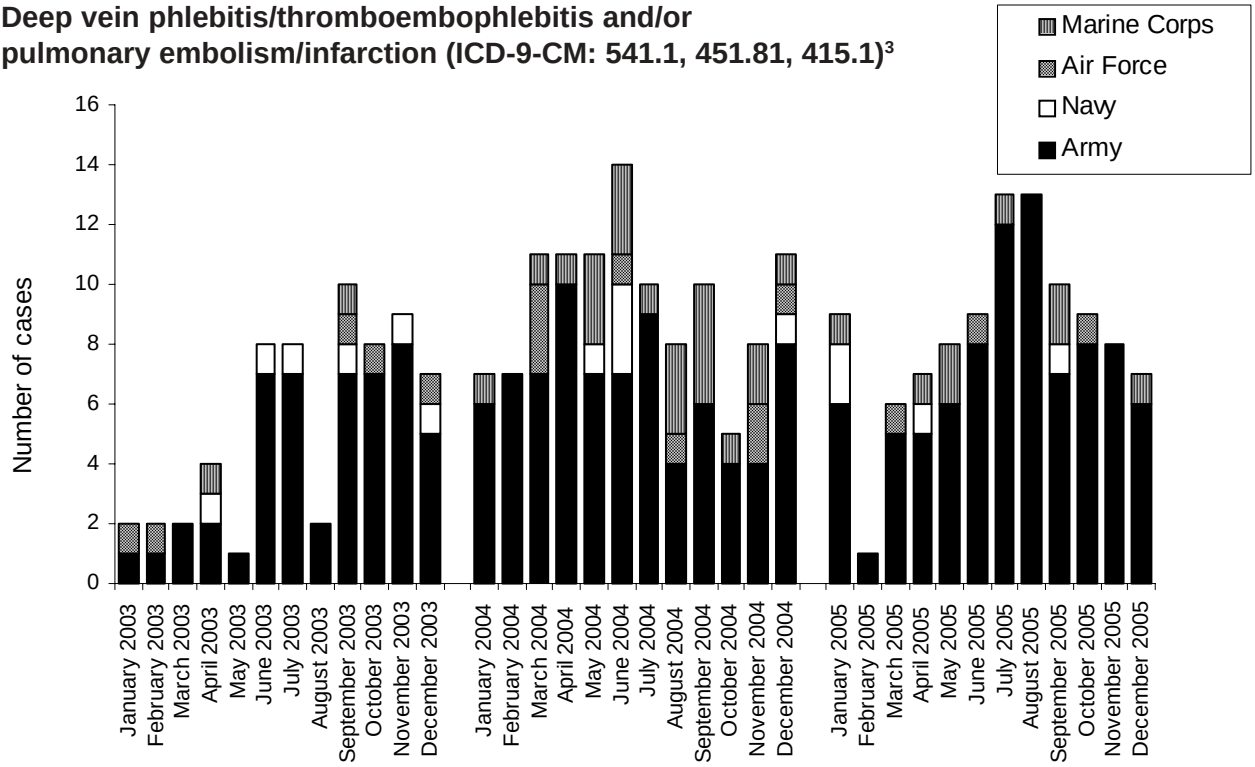
Footnotes:

[1] Indicator diagnosis (one per individual) during a hospitalization, ambulatory vist, and/or from a notifiable medical event during/after service in OEF/OIF.

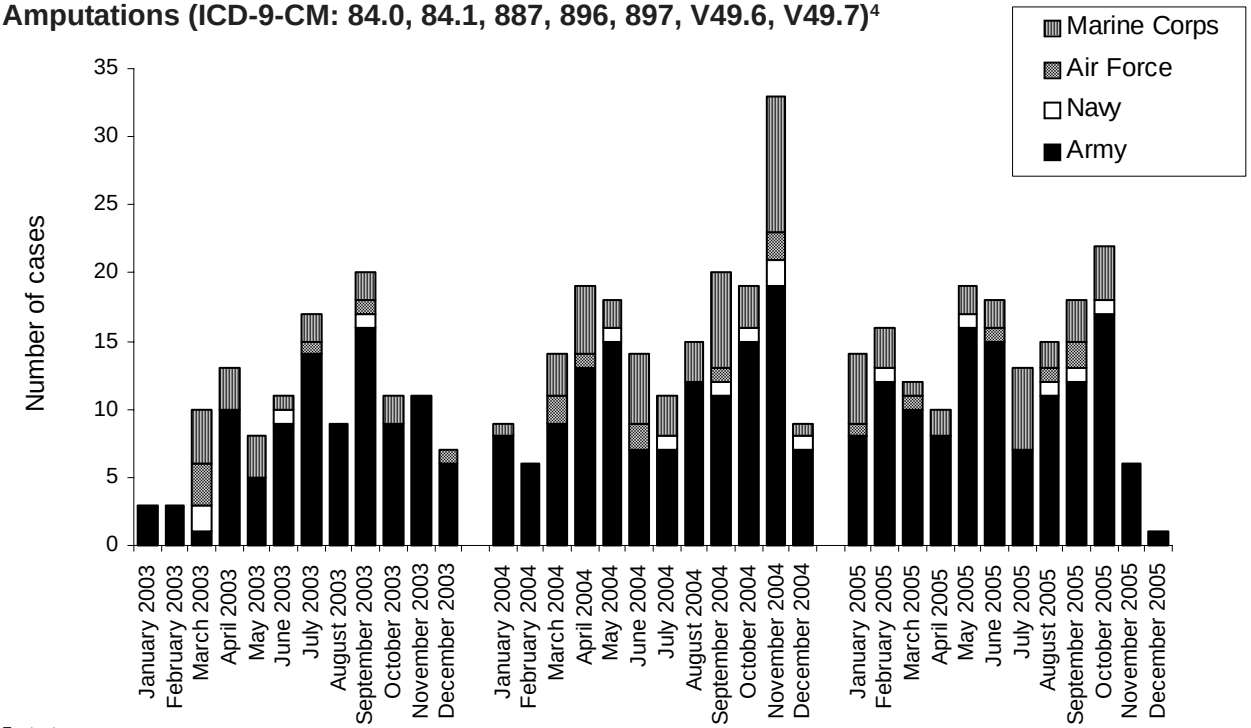
[2] indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.

(Cont.) Deployment related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003-December 2005

Deep vein phlebitis/thromboembophlebitis and/or pulmonary embolism/infarction (ICD-9-CM: 541.1, 451.81, 415.1)[3]



Amputations (ICD-9-CM: 84.0, 84.1, 887, 896, 897, V49.6, V49.7)[4]



Footnotes:
[3] Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 30 days of returning from OEF/OIF.
[4] Indicator diagnosis (one per individual) during a hospitalization of a servicemember during/after service in OEF/OIF.

Sentinel reportable events for all beneficiaries[1] at US Army medical facilities, cumulative numbers[2] for calendar years through February 28, 2005 and 2006

Reporting location	Number of reports all events[3]		Food-borne								Vaccine Preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
NORTH ATLANTIC																
Washington, DC Area	130	50	.	.	1	.	.	1	.	.	.	.	.	.	.	.
Aberdeen, MD	36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Belvoir, VA	84	93	1	1	.	.	.	.	.	1	.	.	.	.	.	.
FT Bragg, NC	300	263	1	5	.	.	1	2	.	.	.	.	.	.	.	.
FT Drum, NY	52	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Eustis, VA	47	43	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Knox, KY	57	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Lee, VA	34	88	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Meade, MD	21	22	.	.	.	.	.	.	.	.	.	.	.	.	1	.
West Point, NY	10	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.
GREAT PLAINS																
FT Sam Houston, TX	38	79	.	.	.	.	.	.	.	.	.	.	1	.	.	.
FT Bliss, TX	78	165	1	.	.	1	1	1	1	.	.	.	.	.	.	.
FT Carson, CO	123	145	2	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Hood, TX	130	277	.	.	.	.	.	1	1	.	.	.	.	.	.	.
FT Huachuca, AZ	12	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Leavenworth, KS	5	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Leonard Wood, MO	90	50	.	.	.	.	.	.	.	.	.	.	.	.	.	1
FT Polk, LA	32	23	.	1	.	.	.	.	.	.	.	2	.	.	.	.
FT Riley, KS	51	59	.	1	.	.	.	.	.	.	.	.	.	.	.	.
FT Sill, OK	33	53	.	.	.	.	.	1	1	.	.	.	.	.	.	1
SOUTHEAST																
FT Gordon, GA	57	42	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Benning, GA	42	55	.	2	.	.	.	.	2	.	.	.	.	.	.	.
FT Campbell, KY	210	57	.	.	.	.	1	.	2	.	.	.	.	.	.	.
FT Jackson, SC	14	49	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Rucker, AL	3	8	.	1	.	.	.	.	.	.	.	.	.	.	.	.
FT Stewart, GA	103	68	.	.	.	.	.	.	.	.	2	.	3	.	.	1
WESTERN																
FT Lewis, WA	108	63	1	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Irwin, CA	9	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Wainwright, AK	28	36	.	.	.	.	.	.	.	.	.	.	.	.	.	.
OTHER LOCATIONS																
Hawaii	99	168	1	4	1	.	2	4	.	.	.	.	.	.	.	.
Europe	168	123	3	5	.	.	1	1	.	.	1	.	.	.	1	.
Korea	61	88	.	.	.	.	.	.	.	.	.	.	.	1	.	1
Total	**2,265**	**2,240**	**10**	**20**	**2**	**1**	**6**	**11**	**7**	**1**	**3**	**2**	**4**	**1**	**2**	**4**

1. Includes active duty servicemembers, dependents, and retirees.

2. Events reported by March 7, 2005 and 2006.

3. Seventy events specified by Tri-Service Reportable Events, Version 1.0, July 2000.

Note: Completeness and timeliness of reporting vary by facility.

Source: Army Reportable Medical Events System.

(Cont'd) Sentinel reportable events for all beneficiaries[1] at US Army medical facilities, cumulative numbers[2] for calendar years through February 28, 2005 and 2006

Reporting location	Arthropod-borne				Sexually Transmitted								Environmental			
	Lyme Disease		Malaria		Chlamydia		Gonorrhea		Syphilis[4]		Urethritis[5]		Cold		Heat	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
NORTH ATLANTIC																
Washington, DC Area	.	.	.	.	25	28	6	6	2	.	.	.	1	.	.	.
Aberdeen, MD	.	.	.	.	6	.	1	.	.	.	.	.	.	.	.	.
FT Belvoir, VA	.	.	.	.	29	25	7	8	.	.	.	.	.	.	.	.
FT Bragg, NC	.	.	.	.	213	188	44	25	.	1	25	33	.	1	1	5
FT Drum, NY	.	.	.	.	5	8	.	3	.	.	.	.	1	.	.	.
FT Eustis, VA	.	.	.	.	19	29	6	9	.	.	.	.	2	.	.	.
FT Knox, KY	.	.	.	.	36	22	2	7	.	.	.	.	1	1	.	.
FT Lee, VA	.	.	.	.	27	68	6	17	.	.	.	.	1	.	.	.
FT Meade, MD	.	.	.	.	19	21	1	1	.	.	.	.	.	.	.	.
West Point, NY	.	.	.	.	9	6	.	.	.	.	.	.	1	.	.	.
GREAT PLAINS																
FT Sam Houston, TX	.	.	.	.	20	54	6	22	.	1	.	.	.	.	.	.
FT Bliss, TX	.	.	.	1	21	60	3	10	.	1	.	.	.	.	.	.
FT Carson, CO	.	.	.	.	51	85	8	20	.	.	3	5	.	.	.	.
FT Hood, TX	.	.	.	.	48	113	12	28	.	.	19	2	.	.	.	1
FT Huachuca, AZ	.	.	.	.	9	8	2	1	.	.	.	.	.	.	.	.
FT Leavenworth, KS	.	.	.	.	4	3	.	.	.	.	.	.	1	.	.	.
FT Leonard Wood, MO	.	.	.	.	34	35	8	2	.	.	1	.	4	.	1	.
FT Polk, LA	.	.	.	.	24	16	6	4	1	.	.	.	.	.	.	.
FT Riley, KS	.	.	.	.	12	49	3	7	.	.	.	.	5	.	.	.
FT Sill, OK	.	.	.	.	7	4	2	6	.	1	.	.	.	.	.	.
SOUTHEAST																
FT Gordon, GA	.	.	.	.	26	29	2	4	.	.	.	.	.	.	.	.
FT Benning, GA	.	.	.	.	26	42	11	10	.	.	.	.	1	.	1	1
FT Campbell, KY	.	.	.	.	122	49	37	6	.	.	.	.	.	.	.	.
FT Jackson, SC	.	.	.	.	8	42	6	7	.	.	.	.	.	.	.	.
FT Rucker, AL	.	.	.	.	2	7	1	.	.	.	.	.	.	.	.	.
FT Stewart, GA	.	.	.	.	64	46	24	19	.	.	2	2	.	.	.	.
WESTERN																
FT Lewis, WA	.	.	.	1	66	38	15	14	.	.	17	7	.	.	.	.
FT Irwin, CA	.	.	.	.	5	9	4	2	.	.	.	.	.	.	.	.
FT Wainwright, AK	.	.	1	.	11	18	2	2	.	.	.	.	13	14	.	.
OTHER LOCATIONS																
Hawaii	.	.	.	.	58	123	7	19	.	.	.	.	.	.	.	1
Europe	.	1	.	.	77	81	25	32	1	.	.	.	4	.	.	.
Korea	.	.	.	.	48	69	9	13	.	1	.	.	2	2	1	.
Total	**0**	**1**	**1**	**2**	**1,131**	**1,375**	**266**	**304**	**4**	**5**	**67**	**49**	**37**	**18**	**4**	**8**

4. Primary and secondary.

5. Urethritis, non-gonococcal (NGU).

Note: Completeness and timeliness of reporting vary by facility.

Source: Army Reportable Medical Events System.

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